Behavioral constituents of chronic pain acceptance: Results from factor analysis of the Chronic Pain Acceptance Questionnaire

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Clinical experience and research show that patients with chronic pain who have a more accepting attitude about their pain experience less distress and function better as compared to those with chronic pain who do not have this attitude. Because this idea has only recently received some empirical scrutiny, the meaning of acceptance and methods for assessing it in relation to chronic pain have not been firmly established. The purpose of this study was to investigate the behavioral components underlying acceptance of chronic pain. Responses to the Chronic Pain Acceptance Questionnaire from 230 persons seeking treatment for chronic pain were submitted for principal components analysis with oblique rotation. Based on percent variance, interpretability, and the scree test, four factors were extracted, accounting for 53% of total variance in 27 items. Factors included (1) engaging in normal life activities, (2) believing that controlling thoughts controls pain, (3) recognizing that pain may not change, and (4) needing to avoid or control pain. Based on analysis of item summary scores, Factor 2, the "cognitive control" factor, showed the smallest corrected factor-total correlation, suggesting that it may not be an important facet of acceptance. Studies of acceptance of pain have shown that it has potentially high utility for understanding the process of adjustment to chronic pain, however, continued study of this complex attitude is needed.

Keywords: Chronic pain, assessment, behavioral factors, attitudes

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1. Introduction

The experience of chronic pain includes significant suffering and life disruption for many people [7,15, 21]. When people with chronic pain seek services, they focus primarily on relief of their "physical" discomfort and less on emotional issues or daily functioning [12]. In line with those goals initial treatment of pain includes attempts to identify and fix underlying anatomical or physiological abnormality. If these efforts fail, treatments may include pharmacological, interventional, or sometimes psychological strategies to reduce pain. Unfortunately, attempts to identify and fix underlying pathology or directly reduce the sensation of pain are not always effective or satisfying to those with chronic pain. When these fail, different strategies directed toward other goals may be more useful. In fact, attempts to control pain that are ineffective in that role may become part of the problem [1,17].

Several recent studies suggest a new approach to pain, an approach that may initially appear counterintuitive, but may lead to better adjustment for the chronic pain sufferer. These studies have shown that, in some cases, acceptance of pain may be more useful than struggling with it [6,18,20]. In fact, greater acceptance of pain in persons with chronic pain predicts lower pain intensity, less anxiety and avoidance, less depression, less physical and psychosocial disability, more daily uptime, and better work status [18]. This application of acceptance to chronic pain parallels its application to other behavior problems including drug or alcohol addiction [16], depression [4], personality disorders [14], and other emotional disorders [10].

Acceptance of pain implies a willingness to experience continuing pain without needing to reduce, avoid, or otherwise change it. For the chronic pain sufferer this likely includes recognizing that pain may be a continuing reality, avoiding fruitless wrestling with pain, seeing that a quality life is possible, and focusing efforts

on life improvement [18]. Thus, acceptance of chronic pain may have multiple components that include dispositions, beliefs, and overt behaviors. The conceptualization presented here appears consistent with the literature on acceptance in relation to other emotional or behavioral disorders [9–11]. It is similarly consistent with the content of the Chronic Pain Acceptance Questionnaire (CPAQ), a self-report instrument designed to measure acceptance of pain [6]. Convincing evidence supports the reliability and construct validity of this instrument [6,18,20]. Despite these developments, research into acceptance of chronic pain is at an early stage

There is a need to further study acceptance of chronic pain in two respects. First, the definition of acceptance of pain discussed here is rationally-derived. It would be useful to empirically investigate its validity and consider refinement of the multiple components implied by the definition. Second, the item content and scoring methods for the CPAQ have undergone little scrutiny, and therefore little evolution, since it was first introduced [6]. Hence, the ways we conceptualize and measure acceptance in persons with chronic pain need further examination.

The purpose of this study was to (1) examine the factor structure of the original item pool from the CPAQ, (2) show whether acceptance of chronic pain is a unitary construct or made up of multiple behavioral components, (3) evaluate the construct validity of the CPAQ, and (4) consider the need for revision of the measure to improve the validity and utility of the data it yields.

2. Method

2.1. Subjects

Subjects for this study were 230 patients (66.5% female) seeking treatment for chronic pain at a university pain management center. Average age was 47.4 years ($SD = 14.0$) and mean years of education was 14.0 ($SD = 2.5$; 90.9% $\geqslant$ 12 years). Subjects were predominantly Caucasian, 80.4%; 17.0% were African American, 1.7% Hispanic, and 0.9% Asian. Most patients were married, 56.1%; 20.4% were single, 15.7% divorced, and 7.8% widowed. The reported median duration of pain was 32.5 months (range 3 to 372). The largest number of patients had a primary complaint of low back pain, 57.6%. Remaining patients reported a variety of pain complaints such as lower extremity, 14.0%, cervical, 7.0%, upper limb or shoulder, 6.6%, thoracic, 5.7%, head or face pain, 4.8%, or other, 4.3%. Only 22.2% of patients were working outside of the home at the time of their evaluation; 51.7% of patients were not working or were working part time due to their pain, 10.9% were retired, and 7.4% were homemakers, leaving 7.8% in other work categories (unemployed, student, other). All patients provided information about demographic variables and completed the CPAQ during their first visit to the clinic.

2.2. Measure

Chronic Pain Acceptance Questionnaire (CPAQ). The CPAQ [6] is a 34-item inventory designed to measure acceptance of pain. It was originally based on a general measure of acceptance and emotional avoidance called the Acceptance and Action Questionnaire (AAQ) [8]. All items of the CPAQ are rated on a 0 (never true) to 6 (always true) scale. The original items were rationally derived to tap aspects of the construct of acceptance. Empirical methods including item-total and inter-item correlations, and reliability statistics were used to reduce the original item pool to a set of 24 items (nine were reverse-keyed) that were summed to calculate a total score. This version achieved a reliability coefficient of $\alpha = 0.85$ [6]. Data from two separate studies show that the total score from the CPAQ is correlated with standardized measures of emotional distress and daily function supporting its validity as a measure of acceptance [6,18].

2.3. Analyses

The original pool of 34 items from the CPAQ was submitted to a series of analyses. Three steps were taken to identify items that were unlikely to be useful for understanding and measuring acceptance. First, frequency distributions for each item were calculated to identify items with low variability or extremely skewed response distributions. Second, corrected item-total correlations were calculated to identify items that did not correlate with the sum of the other items. Third, initial factor analyses were calculated to identify single item factors or other evidence for items with variance that could not be partitioned with other potentially meaningful subsets of items. After these initial item selection strategies, a smaller set of items were submitted to a final principal components analysis to identify the underlying factor structure. Next, the stability and reliability of the factor structure was examined. Due to the lack of an independent sample of adequate size,

cross-validation of the factor solution was conducted on a random subset of the original 230 subjects. This validation sample included 75% of the original sample ($n = 178$). Cattell's salient variables index, s, was calculated to compare the match between the original factor solution and the attempted replication [3]. Finally, additional analyses were conducted to examine component intercorrelations and contributions to the overall construct of acceptance.

3. Results

Frequency distributions for the 34 original items of the CPAQ showed two items with extremely skewed distributions. A majority of patients (52.4%) selected 0 ("never true") in response to the item, "12. The thoughts and feelings I have about pain are just my reactions, not real facts." Similarly, 53.0% selected 6 ("always true") in response to the item, "18. It's important to keep fighting this pain." Three items had corrected item-total correlations that were incongruent with the intention of their content. The items, "4. I don't think it is possible to decrease my basic pain level," "11. I've done my best to control my chronic pain, and it looks like it won't change," and "21. There is really nothing anyone can do to keep from having disturbing thoughts and feelings about pain," each had a negative correlation with the sum of the items not including them. These correlations were not consistent with the definition of acceptance so these items also were excluded from further analyses. Finally, initial factor analyses extracting a range of factors (6–8) with eigen values greater than one showed two single-item factors. The two items, "13. Before I take action, I must be sure in my own mind that the course of action I am taking is best," and "27. In order for me to accept something, I have to feel good about it," were eliminated from further analyses because it appeared that they would not adhere to other items to form internally consistent factors. Incidentally, neither of these items were explicitly relevant to pain. In total, seven items were excluded from further analyses, leaving 27 items. Table 1 summarizes the steps in the item elimination process.

Principal components analysis was conducted to find the underlying components of acceptance as represented by the 27 selected items of the CPAQ. The factorability of the correlation matrix of items was supported by a high Kaiser-Meyer-Olkin measure of sampling adequacy (0.87). Five factors attained eigen values greater than one. However, based on percentage of total variance accounted for, results of the scree test (see Fig. 1), interpretability, and parsimony, a four-factor solution was retained. These four factors accounted for 52.7% of the variance in the set of items. The behavioral components of acceptance were not expected to be independent dimensions. This suggested the use of an oblique rather than an orthogonal rotation method to facilitate interpretation. An initial oblique rotation showed that Factor 1 and 4 were significantly intercorrelated ($r = -0.40$), therefore, the obliquely rotated solution was retained.

Table 2 shows the sorted factor loadings from the pattern matrix of the final, rotated factor solution. Based on inspection of the content of the items with the highest loadings on each factor, they were labeled as follows: (1) engaging in normal life activities, (2) believing that one can control pain by controlling one's thoughts, (3) recognizing that pain may not change, and (4) needing to avoid or control pain.

Based on the same number of factor rules employed for the original factor extraction, the subsample replication similarly suggested a four-factor solution. This solution accounted for 54.3% of the variance. Comparison of the factor loadings in the factor pattern matrices of the two solutions showed that each factor was significantly similar, $s = 0.84$, 0.92, 0.89, 0.80, respectively; all $p < 0.001$. These results provide some evidence for factorial stability and generality.

Next, factor summary scores were calculated. Several items were reversed including one negatively keyed item on Factor 1 and seven items on Factor 4. The latter items were keyed in the direction of needing to control or avoid pain and thus opposite to the notion of acceptance. Item responses for the sets of items with their highest loading on each respective factor were summed. Two sets of correlation analyses were then conducted. The first were corrected factor-total correlations, showing the relations between each factor score and the sum of the remaining factors. Factor 1 showed the largest correlation with the corrected total, $r = 0.63$, followed by Factor 4, $r = 0.40$, Factor 3, $r = 0.33$, and Factor 2, $r = 0.23$. All these correlations are statistically significant at $p < .001$, however, the correlation between Factor 2 and the corrected total translates to just 5% overlapping variance with the other factors. This value compared to 11% for Factor 3, the factor earning the correlation that is the next smallest in magnitude. This low correlation between Factor 2 (believing that one can control pain by controlling one's thoughts) and the other components of acceptance, and its lack of fit

Table 1
Summary of steps to reduce the original item pool of 34 items

Step	Procedure	Items eliminated	Number of items retained
1.	Examination of frequency distributions of item responses.	#12, #18	32
2.	Calculation of item-total Correlations.	#4, #11, #21	29
3.	Initial factor extractions.	#13, #27	27[a]
4.	Correlation of initial factor and total scores.	#8, #25, #26, #29, #33	22[b]

[a]These twenty-seven items were submitted to the final factor analysis.
[b]Following factor analysis correlation analyses showed that the five items constituting Factor 2 showed a low correlation with the other factors and therefore were not included in the summary score calculated for descriptive purposes.

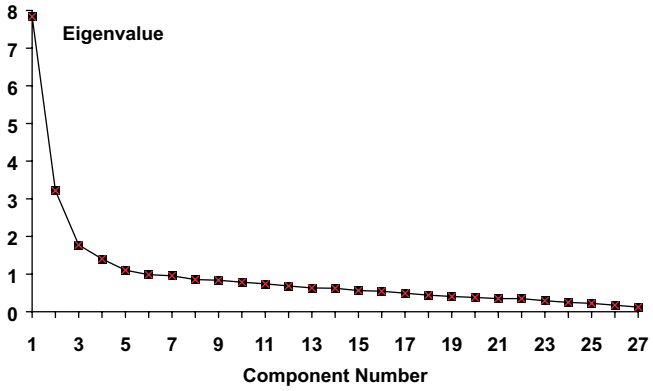

Fig. 1. Scree plot from principal components analysis of items from the chronic pain acceptance questionnaire.

with the proposed definition of acceptance, led to the decision to exclude it from the calculation of the total score at this stage.

The second set of correlations were to examine the interrelations of the summary factor scores with the total not corrected by removal of the respective factor score. The total score was calculated by summing the scores for Factors 1, 3 and 4. Table 3 includes means, standard deviations, internal consistency coefficients, and intercorrelations for the summary scores for the four factors and the total score. As with the corrected factor-total correlations, Factor 1 showed the highest correlation with the total followed by Factor 4, Factor 3, then Factor 2, in that order. Naturally, the correlation between Factor 2 and the total is the same as the corrected factor-total correlation above because it was excluded from calculation of the total. Each of the factor-derived scales and the total score had adequate to good internal consistency. The alpha coefficient for the "recognizing that pain may not change" scale suggested that it is only moderately internally consistent.

4. Discussion

This study, based on the items of the Chronic Pain Acceptance Questionnaire, showed that acceptance of chronic pain is made up of three components. These include "engaging in normal life activities," "recognizing that pain may not change," and a factor labeled "needing to avoid or control pain," which is the opposite of acceptance. This result is congruent with stated definitions of acceptance derived from the developing literature on acceptance in the context of other behavior problems [18]. The notion of "seeing that a quality life is possible" despite pain included in discussion of acceptance of pain to this point may be less important than just engaging in activities that entail a quality life. Both the results of factor analysis and further correlation analysis showed that engaging in normal life activities despite pain may represent the most essential feature of acceptance of pain.

It is interesting that a factor representing the belief that one can "control pain by controlling one's thoughts" (Factor 2) was derived from the item pool of a mea-

Table 2
Results of principal components analysis with oblique rotation of items from the chronic pain acceptance questionnaire

	Item content	Factor loadings			
		1	2	3	4
	Factor 1				
1.	I am getting on with the business of living no matter what my level of pain is.	0.89	−0.06	−0.03	−0.06
2.	My life is going well even though I have chronic pain.	0.87	−0.01	0.00	−0.03
9.	Although things have changed, I am living a normal life despite my chronic pain.	0.86	0.05	0.02	−0.03
20.	Despite the pain, I am now sticking to a certain course in my life.	0.83	0.03	−0.04	0.11
15.	I lead a full life even though I have chronic pain.	0.79	0.11	0.03	−0.10
24.	When my pain increases, I can still take care of my responsibilities.	0.70	0.05	0.00	−0.11
32.	It's a relief to realize that I don't have to change my pain to get on with my life.	0.47	0.23	0.16	−0.27
19.	My thoughts and feelings about pain must change before I can take important steps in my life.	−0.45	0.38	0.10	0.21
3.	It's O.K. to experience pain.	0.34	0.12	0.24	−0.21
6.	It's not necessary for me to control my pain in order to handle my life well.	0.30	0.02	0.29	−0.14
	Factor 2				
8.	I can get control over my pain by decreasing my negative and irrational thinking.	−0.07	0.83	−0.01	−0.17
33.	I can gain control over my pain by being happy and thinking more positively.	0.13	0.73	0.13	−0.16
25.	I will have better control over my life if I can control my negative thoughts about pain.	−0.07	0.63	−0.05	0.18
26.	I can control my feeling associated with pain by how I think and what I do.	0.34	0.55	0.02	0.05
29.	Being able to live with pain is largely a matter of having the right beliefs about it.	0.28	0.38	0.35	0.20
	Factor 3				
28.	I accept the fact that my basic pain level is not going to change in any lasting way.	−0.26	−0.03	0.79	0.14
7.	I've decided the hassle of trying to get rid of this pain just isn't worth it; I'll live with it.	−0.09	0.03	0.68	−0.11
17.	I can live with the idea that I will probably have pain for the rest of my life.	0.25	−0.04	0.65	0.08
16.	Controlling pain is less important than other goals in my life.	0.25	0.14	0.36	−0.15
	Factor 4				
30.	I avoid putting myself in situations where my pain might increase.	0.12	−0.20	0.18	0.86
22.	Keeping my pain level under control takes first priority whenever I'm doing something.	0.18	0.07	−0.10	0.83
23.	Before I can make serious plans, I have to get some control over my pain.	−0.23	0.10	−0.16	0.60
34.	I have to struggle to do things when I have pain.	−0.27	0.09	−0.08	0.52
5.	I would gladly sacrifice important things in my life to control this pain better.	−0.15	0.05	−0.05	0.50
31.	My worries and fears about what pain will do to me are true.	−0.22	0.19	0.11	0.49
14.	There are many activities I do when I feel pain.	0.21	0.14	−0.02	−0.37
10.	I need to concentrate on getting rid of my pain.	0.03	0.34	−0.19	0.37
	Percentage of Variance	29.0	11.9	6.6	5.2

Note: Rotation converged in 11 iterations. The factors were labelled (1) engaging in normal life activities, (2) believing that controlling thoughts controls pain, (3) recognizing that pain may not change, and (4) needing to avoid or control pain.

sure of acceptance of pain. Initially these items were intended to represent the opposite of an accepting attitude [6]. This was based on the view that trying to control thoughts and feelings may be at the root of many common psychological problems [10,11]. The items on Factor 2 seemingly assess adherence to the cognitive component of a cognitive behavioral view of pain [22]. Previous study has suggested that standard

Table 3
Descriptive statistics for subscales and total score for chronic pain acceptance questionnaire

				Cronbachs	Intercorrelations			
Scale	(# items)	M	SD	Alpha	1	2	3	4
1. Engaging in activities	(10)	33.3	13.2	0.90				
2. Thoughts control pain	(5)	14.8	6.8	0.74	0.32**			
3. Pain may not change	(4)	9.1	4.8	0.58	0.37**	0.29**		
4. Need to avoid/control[a]	(8)	13.8	7.9	0.79	0.48**	−.12	0.18*	
Total[b]	(22)	56.3	20.4	0.89	0.92**	0.23**	0.54**	0.74**

[a]The score for the "need to avoid/control" scale was calculated by reversing seven items (as a result higher scores mean less avoidance and need for control).
[b]The total score for the entire scale is the sum of the "need to avoid/control" items added to the scores from the "engaging in normal life activities" and "recognizing that pain may not change" items. The summary score for Factor 2 ("believing that controlling thoughts controls pain.") were not included in the total score because the showed a relatively low correlation with the other factors.
$*p < 0.01$; $**p < 0.001$.

cognitive behavioral therapy for chronic pain can lead to enhanced acceptance of chronic pain [6]. However, results from the current study, showing a relatively low correlation between this "cognitive control" factor and the other components of acceptance, suggest that focusing on the direct change of thoughts may be peripheral to acceptance of chronic pain.

The item selection and scoring procedure suggested here nearly replicate the results of Geiser [6]. His earlier study yielded scoring instructions that included 24 of the total 34 items of the CPAQ. The items selected in the present study include 20 of the 24 selected by Geiser (83.3%) plus two items not selected by his results, "15. I lead a full life even though I have chronic pain" and "32. It's a relief to realize that I don't have to change my pain to get on with my life." The scoring procedure described by Geiser did not include the five items assigned here to Factor 2 ("believing that controlling thoughts controls pain"). The results presented here also support their exclusion.

Results presented here provide support for the validity of the CPAQ. The factors produced from factor analysis closely match the current conceptualization of acceptance of pain. The fact that the measure yields interpretable subscales may add to a more detailed analysis of this variable and stimulate a wider array of research applications. In proposed clinical applications acceptance of pain has been a potentially difficult goal to achieve because it is clearly molar in character [20]. However, considering acceptance in terms of its constituent parts may facilitate the design of treatment strategies. Shaping up normal life activities, helping patients to see that continuing pain is likely, decreasing the perception of a need to control pain, and decreasing avoidance behaviors, may represent more tangible or workable goals for the clinician. Defining acceptance at the behavior level is likely to lead readily to identification of modifiable influences on these behaviors and then to treatment strategies that increase acceptance.

The multidimensional nature of acceptance of pain also raises a potential problem. Based on the analyses conducted here, the acceptance measure includes overt behavioral components, engaging in more normal life activities and less avoidance. The content of these components resembles the content of common measures of daily functioning and activity, the variables we wish to predict or understand by studying acceptance. One could argue this is content contamination that may inflate correlations between the acceptance measure and measures of daily functioning. There are several appropriate responses to that argument. First, it is useful that acceptance includes overt behavioral components. If a person claims they accept the chronic nature of their pain but does not disengage from trying to reduce it nor devote their efforts toward life enhancement, one would rightly doubt their level of acceptance. Also, the availability of separate component scores for acceptance of pain provides the opportunity for researchers or clinicians to focus on the variables that are most pertinent and least contaminated for their application.

The concept "acceptance of pain" derives from a contemporary radical behavioral approach and not a cognitive behavioral approach per se (see [13]). Loosely speaking, it is not meant to be a new coping strategy. Acceptance is not just engaging in normal activity as a way to reduce pain. It is meant to be disengaging from pain and engaging in normal activities for their own sake. However, acceptance is not necessarily incompatible with current cognitive behavioral therapy for chronic pain. In fact, the idea of acceptance is firmly situated in some forms of cognitive behavioral therapy such as Rational Emotive Behavioral Therapy [5]

and Beck's treatment of anxiety disorders [2]. Also, although thoughts and feelings clearly play a role in acceptance, acceptance is not meant to be a new cognitive process. The factors derived here that include increasing normal life activities and decreasing attempts to control pain clearly demonstrate that acceptance is not simply a thought or decision but an attitude that entails a range of overt and cognitive responses.

This study has shortcomings. It was constrained by the original item content of the CPAQ. There was relatively little chance of finding factors that had not influenced the original writing of items. Factor 3 included only four items, achieved only marginal internal consistency, and was relatively less correlated with the other factors. It may require additional item writing or it simply may be less useful in the future. Subsample analyses replicated the initially derived factor structure of the CPAQ, however, it was not cross-validated on an independent sample. The factors described here may not generalize to other patient samples. Clearly, replication is needed. The suggested minor changes in the methods of calculating an overall score and new suggestions for subscale scores for the CPAQ should not be seen as final.

Studies of acceptance of chronic pain have been fruitful. They have shown that it may be an important behavioral construct with the possibility of improving our understanding of the suffering and impaired function of persons with persistent pain. The present study facilitates further investigation by showing that (1) the term "acceptance of pain" implies a set of meaningful behavioral constituents and (2) the measure of acceptance appears relatively sound. Further data are needed to clarify the relations between acceptance of pain and overall adjustment. Future studies may examine the role of acceptance in the process of current treatments for chronic pain (e.g. [19]), study the application of current behavior therapy approaches such as Acceptance and Commitment Therapy [10], or may seek to define and evaluate new interventions that effectively foster acceptance of pain.

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